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Final Report

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Wild Food Harvest in Saskatchewan

Conducted by K. Brunner Consulting

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WILD FOOD HARVEST IN SASKATCHEWAN

FINAL REPORT

OCTOBER 30, 1990

Funded By Saskatchewan Agriculture Development Fund

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WILD FOOD HARVEST IN SASKATCHEWAN

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EXECUTIVE SUMMARY - ABSTRACT

Plots of managed wild blueberry stands were established with 17 co-operators on 7 acres from Hudson Bay to Meadow Lake. The methods of clearing land and mowing blueberries look fairly economical and practical for farmers. Costs start at $138.00/acre for light brush cover. After several more years, the average harvest levels and profitability can be determined.

Horticultural varieties of blueberries were planted by 7 co-operators.

Support work continued with depot owners, buyers and sellers.

1990 was an average year for wild berries. The best harvest was in the north east. Total harvest was 47,660 pounds.

EXECUTIVE SUMMARY - MANAGEMENT OF WILD BLUEBERRY STANDS

To date, wild blueberries on the market have been picked from the wild. The droughts of 1986 and 1989 and the resulting low harvests have demonstrated the need for blueberry farming. This is expected to stabilize harvest levels. Farmed blueberries are also expected to be cheaper than those picked in the wild. Retail prices average between $3.00/pound and $3.75/pound, an all time record.

The cheapest, fastest method of farming is managing existing stands of wild blueberries. The alternative method is planting horticultural varieties. 17 plots were developed on 7 acres of crown and farm land in the Meadow Lake, Shellbrook, Prince Albert, Nipawin and Hudson Bay agriculture districts. Plot sites were selected from a variety of habitats - jackpine, poplar and black spruce. Soil type, moisture availability, tree density and frost proneness varied greatly among these sites. Lack of moisture repeatedly appeared to be an important limiting factor yields.

During land preparation, trees were cleared off and cut down to ground level. Logs, branches and debris were removed. Shrubs and blueberries were pruned in one operation with a 48" flail mower at an average rate of 4 - 6 hours per acre in very light bush. Mowing was done during the dormant (leafless) period in spring and fall. The costs of land preparation and mowing started at an estimated $138.00/acre in light bush. The time and costs escalate rapidly with denser tree cover. Blueberries have to be mowed within 1" of ground level in order to stimulate the growth of many times more new shoots. Repeated mowing gradually causes the blueberry stands to thicken out. It may take a dozen years or more to reach optimum densities. However, once the fields are established, they can be productive for 70 years or more. Plots mowed during the spring of 1990 will be harvested for the first time in 1991. Those mowed during the fall of 1990 will be ready in 1992.

Weed species were fairly consistent within plots of similar habitat. Velpar doesn't control bunchberry and labrador tea both of which occur in plots. Two plots were sprayed with Velpar.

In the future, moisture adding and conserving management methods should be a top priority - irrigation, mulching and shading.

This is the first time that farmers are considering blueberries as a potential crop. Over the next dozen years we will learn which habitats are most productive and determine the profitability of blueberry farming.

CULTIVATED BLUEBERRY PLANTINGS

7 co-operators have planted small numbers of the blueberry cultivars Brunswick, Augusta and Cumberland.

1990 HARVEST SUMMARY

These harvest figures were totalled through contacts in the wild berry buyer and seller network. The average retail blueberry price stayed at $3.00 - $3.75/pound until Labour Day. This was up from $2.25 - $2.75 in 1989. Pickers charged an average of $1.75 - $2.00/pound for wild blueberries, up from $1.50 in 1989.

The best harvest came from the northeast part of the province - La Ronge and Prince Albert eastward to Nipawin, Melfort, Tisdale and Hudson Bay.

TOTALS	- Wild Blueberries	- 33,600 lbs.
	- Saskatoon Berries	- 10,300 lbs.
	- Chokecherries	- 2,460 lbs.
	- Pincherries	- 500 lbs.
	- Lingonberries (low cranberry)	- 300 lbs.
	- High Bush Cranberry	- 500 lbs.
Total Harvest Recorded		- 47,660 lbs.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

1. ABSTRACT

Plots of managed wild blueberry stands were established with 17 co-operators on 7 acres from Meadow Lake to Hudson Bay. The methods of clearing land and mowing the blueberries look fairly economical and practical for farmers. Land preparation costs start at $138.00/acre for land with little brush cover. It will be several years before average harvest levels and profitability can be determined.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

2. BACKGROUND AND OBJECTIVES

Large scale organization and marketing of wild blueberries and lingonberries across northern Saskatchewan was started in 1985. The crop failures of 1986 and 1989 have demonstrated the need for blueberry farming to stabilize the harvest levels.

Hand harvested blueberries from the wild, sell for between $2.00 - $3.75/pound retail. The market for berries at this price is limited. The main competition to local blueberries is from cultivated highbush varieties which sell from $1.50 - $1.70/pound retail. The only way to compete in this large grocery store market is by farming wild blueberries.

The cheapest, fastest method of farming is managing existing stands of wild blueberries. The alternative method of planting horticultural varieties is more expensive, slower, but high yielding.

Therefore the main objective of the 1990 work is to establish small plots with farmer co-operators. Through the years, we will learn three things from these plots:

1. Whether blueberry farming is profitable or not.
2. Which habitats are most productive. The plots were located in a variety of habitats for this reason.
3. How farmers can practically and economically prepare land and manage the wild stands.

3. EXPERIMENTAL METHODS

3.1 Plant Cover

The wild lowbush blueberry - Vaccinium myrtilloides is most common in Saskatchewan and other northern areas. Vaccinium angustifolium is most common in the Maritimes and Quebec. It has also been found in the Hudson Bay area. At this time, it isn't known whether there are whole stands of this specie or just a few isolated plants.

Areas with a density of at least 20 - 50 % cover of blueberries were chosen for plots. This is the minimun density needed to develop productive fields in the Maritimes. Several plots reached densities of up to 90% blueberry cover.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

The blueberry plants looked equally vigorous in all areas. It would be impossible to distinguish plants from different parts of Saskatchewan on the basis of appearance.

3.2 Habitat

Varied considerably among plots. A variety of sites were chosen for plots because it is not known which factors or which habitats will consistently produce high yields in the future. The major differences are in soils, moisture availability, plant community, tree density and frost.

Soils - Blueberries grow in acidic soils (pH 4.5 - 6.5) in Saskatchewan. They are found on light, sandy soils which are usually too marginal for other agricultural crops. These acidic soils are generally restricted to the northern farming fringe and northern crown land. There was no trend towards higher pH's in eastern Saskatchewan, even though the bedrock increases in pH. Soil samples from the north tended to be lower in pH and coarser textured than those from the northern farming fringe.

Soil tests have been taken over the north since 1984. Fifty more soil tests were taken in the northern farming fringe in 1989. The average soil textures at 0 - 6" depths were split between sandy and organic. The average soil pH was 5.5. The pH varied from 4.0 to 6.5. Nitrogen levels were uniformly low at .5 ppm. Phosphorus levels averaged at 20 ppm. Potassium levels started at 30 ppm and levelled off at 330 ppm. Sulphur averaged between 2 - 10 ppm.

Moisture Availability - Blueberries need a steady water supply when the berries are filling out, from the beginning of July until mid August. Since berries are over 80% water, they need an ample supply of water as well. Insufficient moisture has been a cause of low blueberry yields in this province because the plants generally grow on fast draining, sandy soils and our annual precipation is low. Precipitation in the Maritimes, the heart of the blueberry industry, is double that of the prairies.

Plot sites were chosen because they had several of these characteristics:

- mid to low slope positions which collect moisture from the upper slopes. There must be air drainage from the site in order to reduce the danger of frost, especially on lower slopes.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

- high water table often indicated by vegetation - alder, muskeg tea, willow

- richer, thicker soil; thicker humus layer which is characteristic under poplar

- water supply for irrigation - creek, slough, muskeg or possibility for sandpoint develpment

In order to conserve moisture several plots were mulched. Most co-operators left trees standing in the plots to provide shade and retain moisture. These two management methods will be discussed later.

Plant Community - Jackpine comes up after a forest fire. It usually grows on sandy, coarse textured soils. It is the driest of the communities with the thinnest topsoil (sometimes 1/2"). These are often the most acidic soils. Alder was the shrub understory in several plots.

Poplar also regrows after a fire. The soil tends to be richer, and finer-textured than in jackpine communities, with a thicker humus layer. In parts of New Brunswick, fields are not usually developed out of poplar forest because of its aggressive suckering habit.

Black spruce. The water table is very high in this community. The soil is peaty, and thick with lush blueberry growth. When black spruce grows on lower slopes, it will be frost prone, unless there is good air drainage. Blueberry and Labrador Tea were dominant in the plots.

Open, logged, burned over areas. Blueberry rhizomes were shallower in several shaded plots (1 - 2") than in several open plots (2 - 3"). Blueberry plants are more frost prone in these open areas, than in adjacent areas under trees. This was an observation by several of the plot co-operators.

Tree Density - varied from 50 trees/hectare to 6,000 trees/hectare. Average tree diameters ranged from 1" to 10". Blueberries growing under the dense shade of mature trees likely have shallow rhizomes. These stands may take many more years to recuperate from tree clearing than those growing under young, open tree stands and full sun. It may be very important to let them rest for a year before pruning and spraying.

Frost - some areas are more frost prone than others. Unfortunately, this tendency can vary greatly within short distances, and weather records are only kept at major towns. The only available information is from older berry pickers. The most damaging frosts occur during bloom in June. Overhead irrigation is used to combat late spring frosts. They are another major cause of low blueberry yields.

3.3 Land Preparation

Clearing Off Rocks - large rocks are usually removed with a front end loader on a tractor. This is a major expense in land preparation. However, none of the plots were rocky.

Clearing Off Trees - trees in one plot were cleared off using skidders and tractors with front end loaders. The roots were pulled out of the ground, leaving large holes and areas with no blueberry cover. This work was done when the ground was dry to reduce the amount of soil removed with the roots. In the Maritimes, stump porters were successfully used to pull out tree stumps - especially large ones. This equipment is used in lumber mills to unload logs. A few porters have been located near Meadow Lake and Hudson Bay. A video with footage of the stump porter in use is available from the Rural Service Centres. A claw on a hydraulic arm behind a tractor, and chains have been commonly used to pull out smaller stumps.

Most of the co-operators were gradually cutting their trees down with chainsaws and hauling them away for firewood. They cut the stumps down to ground level so as not to interfere with mowing. The ground around the stumps gradually sinks a bit and the stumps may have to be recut. These stumps should be removed from fields that will eventually be machine harvested because the ground has to be very level.

The trees on several plots were so small (1" - 3" diameter) that they were cut down with axes and brush saws, and piled in piles to be burned next winter.

Several co-operators believe that the cheapest, fastest way to remove the trees is by shearing them off right at ground level with a caterpillar during the winter. They will try this method during the winter of 1990 - 1991.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

Co-operators saved time by pulling the trees outside the blueberry field and delimbing them there. In this way, the branches fell outside of the field and didn't have to be hauled away separately. Deadfall was carried and raked out of the fields because it interferes with mowing and harvesting.

Levelling Land - all the plots were fairly level and flat, so no land levelling was done. A rome disc and roller is used to level land in the Maritimes. The field is disced twice, at right angles, then rolled. Unfortunately this cuts up and damages the blueberry rhizomes.

Covering Bare Patches Of Ground - the plots that were cleared with machinery were left with patches of ground with no blueberry cover. Research in Maine has shown that these areas have an extreme, dessert-like micro climate. There is no humus for the blueberry rhizomes to grown into and fill in the space. Many such areas in Maine haven't filled in after 10 years of production. New seedlings can be planted in by hand but this is expensive. A new approach has been to cover the bare spots with 2" - 4" mulch (sawdust, wood chips or weed free straw) providing a medium for blueberry rhizomes to penetrate. Several plots were mulched.

Clearing Bush In Strips - Most of the co-operators did not want to clear off all the trees on their blueberry plots because they would dry out. Several have decided to clear strips of bush in a north - south direction to maximize shade to the blueberry plants. Strips from 50 - 200 feet wide will be cleared off for blueberries and alternate with strips of untouched bush. The advantages are: more moisture retention from shade, snow trapping and reducing wind speed. Bush also provides a home for bee pollinators which increase blueberry yields. Its faster to run equipment down a series of long strips than a series of square clearings. The suckering habit of poplar in the bush strips will mean more weed control work.

Leaving The Field - for a year after clearing, for the rhizomes to grow deeper into the soil and become less sensitive to burning and pesticides. This was not possible to do in the plots because the time frame of the contract was too short.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

3.4 Pruning

The blueberry plant has an extensive underground rhizome system similar to that of quackgrass. When the above ground shoot is cut off within 1" of ground level, it's apical dominance is removed and several new shoots grow from the rhizome. The blueberry stands thicken out after every pruning, resulting in high yields. Most fields are pruned many times before they reach optimal density.

Pruning and mowing are the two methods of pruning. Several plots had been burned accidentally in the past. All plots were mowed for this project. Both types of pruning are done when the blueberry plants are leafless and dormant to minimize the shock of pruning. It can be done in spring before leaf out (May) and in fall after leaf drop (September, October).

Mowing - Blueberry plants mowed during the fall of 1989 and spring of 1990 will be harvested for the first time in 1991. Those mowed during the fall of 1990 will be harvested for the first time in 1992. The first few harvests are expected to be light.

There has been a major conflict of time between blueberry mowing and other farm priorities.

Spring 1990 - There were 3 weeks between snow melt and leaf out. Mowing season was about 2 weeks long. Farmers were preparing for seeding during the mowing season. The blueberries leafed out during seeding.

Fall 1989 - 1990 - There were 1 - 3 weeks between leaf drop and snowfall. Farmers were still combining, baling and hauling bales during the mowing seasons.

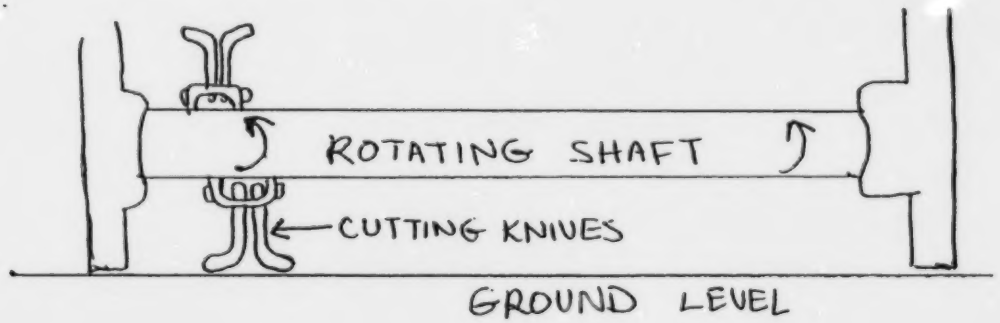
The Maritimes 2 - 3 month mowing season is considerably longer than what we've experienced here in 1989 -90. Farmers are likely better off removing trees and shrubs during slow seasons on the farm (winter, summer) in order to have more time during the short mowing season.

Bush hogs and rotary mowers tend to cut the blueberry plants too high (3" - 6"). They may be useful in mowing off shrubs like pincherry, rose and poplar, which can grow a foot or more during the growing season. The mower would have to be set above the height of the blueberry plants. These shrubs can also be controlled with a hockey stick or with application of Roundup.

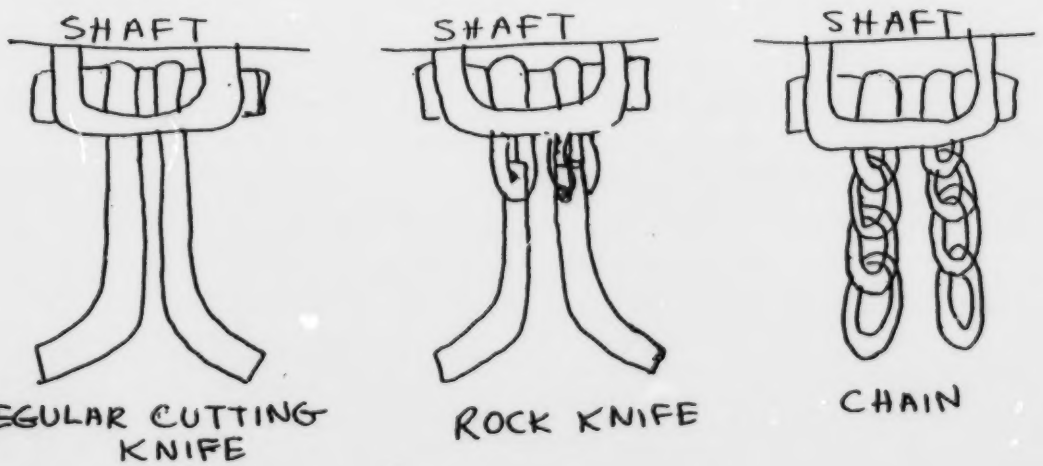
A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

Brush cutters were used to start plots that were too heavily treed and/or without access by tractor and flail mower. If these plots become productive, then more trees will be cleared and access roads will be upgraded enough for flail mowers to be used. Shrubs were cut with a ciruclar saw blade with small teeth, 1/3" in diameter. Then the shrub stumps and blueberries were cut to ground level with a triangular shaped grass blade. It isn't practical to cut saplings greater than 1" in diameter. Brushcutters are too slow and need too much servicing to be used widely.

A 48" wide flail mower was used to mow plots with very good results. It has a 3 point hitch attachment, weighs about 350 lbs. and runs at 2200 rpm. It was pulled by several tractors ranging from 20 to 100 hp. It seemed to mow most effectively at 50 hp and over. Four different lengths of PTO driveshafts were used to fit all the tractors. Plants are cut by 32 pairs of cutting knives in 4 rows along a rotating horizontal shaft.



Regular cutting knives are solid and tend to break off when they hit rocks and tree stumps.



Rock knives are shorter and attached to a link, which in turn is attached to the rotating shaft. The extra articulation makes the knives more flexible and less likely to break.

Several people suggested high tensile strength chain which would have 3 links and articulations for flexibility. Chains would tend to beat the plants rather than cut them. This hasn't been tried yet.

Groundspeed was kept at 1 - 2 mph. The mower cut, shredded and mulched shrubs, saplings, and blueberries into small pieces, down to ground level. Alder and willow shrubs and poplar over 3/4" in diameter tended to get "chewed up" and left standing. The mower cut dense shrubs (approximately 1 meter square) much better when it was lifted up several inches. Old rotting tree stumps were mashed to pieces. The mower dug 1" - 2" deep into the ground in very sandy and very peaty soils. Side wheels or "skiis" are definately needed on the sides of the mower in order to stop this. The mower stayed at ground level much better on solid ground. The mower also cut up and flattened small hummocks.

One plot was mowed twice at angles of 90 degrees. It was more level after the second mowing. After a few mowings all the fields should become much more level.

Narrow 36" - 48" flail mowers conform to the contours of a field better than wide mowers and cut a larger percentage of wild blueberries to the desired height.

A sickle mower is being tried on several plots during the fall of 1990 in the Meadow Lake District by Dave Cubbon. Preliminary results look good.

Burning - has been the traditional method of pruning but has become less popular. Burning was not tried on the plots because of the danger of fire getting out of control. In addition, burning reduces soil organic matter, and these soils are generally low in organic matter. If burning is done, then:

- water tanks should be set up in the field and a firebreak built around the field in case the fire gets out of control.

- straw is spread on top of the plants in order to feed the fire. This gives a light, fast, flash fire which does the least damage to the plants.

- propane as a fuel, gives a heavy burn and damages plants. Hot, dry weather is needed for thorough burning.

Burning Compared To Mowing - Mowing conserves soil organic matter; burning reduces soil organic matter. Mowing costs are 1/3 to 1/2 of burning costs. With burning there is always danger of fire getting out of control. Burning can also scorch the rhizomes and damage the blueberry plants.

The major advantage of burning is that it gives better insect, disease and weed control than mowing. The trend is towards using mowing as a regular pruning method, and using burning only when disease, insect and weed populations build up.

3.5 Mulching

Research in Maine has shown that mulches conserve water in blueberry fields. Sawdust and woodchips were the best mulching materials. Straw tends to spread too many weed seeds. 2" - 4" of mulch also prevents some weeds from coming up in spring and acidifies the soil pH which discourages some weeds. Sawdust and bark chips were put on several plots during the fall of 1990 in the Meadow Lake District. With our frequent summer droughts, mulches will likely be much more necessary here than on the coast.

3.6 Weeds

The types of weeds found in the plots seemed to vary with the type of habitat and amount of available moisture. The common weeds were:

Jackpine (dry) - bearberry
- lingonberry
- reindeer moss

Poplar (medium moisture) - poplar saplings
- pincherry
- bunchberry
- grasses, several species
- wild strawberry
- bedstraw
- dogwood
- goldenrod
- aster

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

Wet areas - willow
- alder
- labrador tea

Disturbed Areas - poplar saplings
- grasses

Spring cut shrubs grew back to an average height of 8" - 12" during the summer. They can be controlled by cutting several times during the summer to a level slightly above that of the blueberries (6" - 8"). They would also be controlled by glove applications of glyphosate (Roundup).

Velpar is a systemic herbicide which controls some woody shrubs such as poplar, chokecherry, wild rose and willow; grasses; and some herbaceous weeds.

It was applied at a rate of 6 litre/hectare with a backpack sprayer before spring leaf out. Gary Brown, a blueberry extension worker from Nova Scotia suggested leaving the plots a year before spraying so only 1 plot in Hudson Bay and 1 in Meadow Lake were sprayed. The degree of control varied from good to poor. It is not certain why there was poor control in one plot. It could have been that there was too little rain after spraying to wash the chemical down to the blueberry roots.

3.7 Fertilizer

No fertilizer was applied to the plots. Co-operators have to have other management practices under control before they can use fertilizer effectively.

3.8 Irrigation

All plots were located near water for irrigation and frost control. Irrigation won't be used until the fruiting year (1991) at the earliest. Several plots have very high water tables, and may not need irrigation.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

3.9 Harvest and Yields

Gerry Ivanochko has measured yields of 800 pounds/acre at the research plots near Besnard Lake. Yields would be expected to increase over the years, as the blueberry stands fill out. The plots cut in the fall of 1989 and spring of 1990 will be harvested in 1991. Plots cut in the fall of 1990 will be harvested in 1992 for the first time.

4. RESULTS

17 co-operators in the Meadow Lake, Shellbrook, Prince Albert, Nipawin and Hudson Bay agriculture districts have developed wild blueberry stands. The majority of plots are located on private land, but several are on crown land.

Between the spring and fall mowing seasons, approximately 7 acres of blueberry stands were cut half by flail mower and half by brush cutter. The flail mower was restricted to land with fairly light bush (poplar less than 2" in diameter); few mature standing trees or stumps and good road access. Four plots were flail mowed and the average land preparation costs were as follows:

	Time	Costs
- clean up - picking up logs branches, stumps and roots	4 - 15 hours/acre	$18 - $70 per acre at minimum wage
- cutting down trees, hauling them away, cutting stumps to ground level	not needed on these plots	
- mowing with flail mower	4 - 6 hours/acre	$120 - $180 per acre*

Estimate of value of land preparation - $138 - $250/acre

- The co-operator usually supplies the labour and some of the equipment for land preparation.

* If the custom rate is $30/acre.

As a comparison, preparing land and mowing with a brush cutter took between 50 and 150 hours of work per acre.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

Blueberry growth from the spring mowing looked good in all the sites. New shoots grew 4 - 8" tall on the average. Stems that were mowed very close to ground level, produced several new shoots. From my observations, the average was 3 - 5 new shoots. So there is a net increase in the density of stands. However, several areas that were cut 2 or more inches above ground level had a lot of plants with only 1 new shoot per cut stem.

5. CONCLUSIONS

1. The methods of land preparation and mowing that have been used preserve and are effective in thickening out blueberry stands. However the height of mowing has to be done close to ground level.

2. Clean up and flail mowing in light bush is economical and possible with the equipment that is available. Costs and time escalate rapidly when the tree cover is dense, so it' usually worth developing light bush first.

3. From the work done in 1989-90, it seems that the busy spring and fall seasons on the farm conflict directly with blueberry mowing and spraying. Some farmers may have to contract out some of the blueberry work.

4. The Extension Agrolgists have put alot of their own time and determination into getting these plots developed. Thanks to them and to the farmer co-operators who weren't afraid to try growing something different. All in all, this is the first year that blueberries are seriously being looked at as a new crop.

5. During the next few years, management methods to add or conserve moisture will be important because we have been losing yields due to drought. Mulching, irrigation and shade retention are three of these methods.

6. The most important results and conclusions will be drawn after many harvests when the profitability of blueberry farming will be determined.

A. TECHNICAL REPORT - MANAGED WILD BLUEBERRY STANDS

6. IMPACT ON SASKATCHEWAN AGRICULTURE

Wild blueberries provide a perennial ground cover and a dense mat of underground rhizomes which protect soils from erosion. This is especially important because blueberries usually grow in light, sandy soils that are erosion prone. Blueberry fields may have soil conservation potential in the northern farming fringe.

Over 250 square miles of land south of the provincial northern forest are potential blueberry growing areas. Some of this land is privately owned and some is in crown land. The Maritime blueberry industry is based on approximately 40 square miles of managed stands. It generates $40 million in annual sales and $120 million in spinoff industries and service. It is not known how many square miles of land support blueberry stands in Saskatchewan at this time.

Blueberry land is often too light and sandy for any agricultural use except grazing. A lot of it is left in bush. Most of the acres put into blueberry production will be additional acres added to the agriculture economy because they don't have to be taken from another crop.

B. CULTIVATED BLUEBERRY PLANTINGS

Seedlings of the blueberry cultivars Augusta, Brunswick and Cumberland were given out to co-operators during the spring of 1990. 7 co-operators shared the 200+ plants. There was an 80% survival rate by the end of summer.

2 co-operators want to modify the pH of their soil to increase its acidity. This is done by adding fertilizer with sulphur to the soil. Two such fertilizers are 16-20-0-14 and 21-0-0-24. The last number is sulphur. Fertilizer will be added to the soil in 1991, because it was felt that the nitrogen in the fertilzier might overstimulate leafy growth in the plants at the expense of root establishment. Blueberry roots are very slow to get established. The pH modificaton table is as follows:

lbs. of actual sulphur per 100 foot square needed to reduce the soil pH to acid levels

	Soil Texture		
Intial soil ph	sandy	loam	clay
8	4	6	8
7	3	4.5	6
6	2	3	4

C. BUYERS AND SELLERS LIST UPDATE

The buyers and sellers were contacted several times during the summer in order to update the 1989 list. Berries are presently harvested in small quantities by many pcikers over the whole province. A listing service is needed to tie together sources of supply and to local markets. The listing service connects buyers and sellers. This helps move berries out of local areas. For example, the best harvest was on the east side of the province and these berries were shipped out to markets across the province. This works the same as the provincial feed listing service. 25 buyers and 66 sellers are listed.

D. FUNDING UPDATE

The update was started in 1989. The ADD Secretariat is updating all the funding for wild berry projects, so there is no need to duplciate their work.

E. DEPOTS

Three new depots, or buyers were added to the Buyers and Sellers listing service. Depots were phoned several times during the summer, especially if they had good local harvests and were looking for markets.

F. MUSHROOM AREA SURVY

The major commercial mushrooms harvested are chanterelles and pine mushrooms. The summer of 1990 was too dry for a good harvest and too dry to continue the 1989 mushroom survey in greater depth.

G. DEPOT ASSOCATION SUPPORT

The Northwest Berry Association was formed in 1989. Members were depot owners on the Green Lake - La Loche road. They applied twice and received funding from the Sask. Power Fund in the form of a guaranteed loan with which they were to buy berries. Unfortunately, this area had dry weather and a very small berry crop this year. The loan can be reapplied for in 1991.

H. INFORMATION MAIL OUTS

Several information sheets were mailed out.

1. The Buyers and Sellers lists were sent to all buyers and sellers.

2. The University of Maine extension bulletins were sent to the Extension Agrologist to pass on to the plot co-operators, on these topics:
   - weed management
   - mulching
   - enterprise budget
   - filling in bare spots in blueberry fields

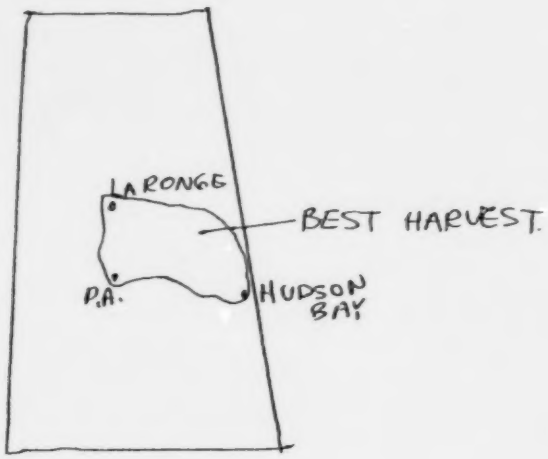
3. Harvest Summary 1990 - was sent to all buyers, sellers and Extension Agrologist.

4. Wild blueberry promotional pamphlets were sent to the Blueberry Festivals and to several sellers.

5. Estimates of highbush cranberry production sheet was sent to Extension Agrologists Brian Simm and Don Perrault.

I. 1990 HARVEST SUMMARY - KALYA BRUNNER

*1990 experienced more rains than 1989. Fall frosts were not widespread until well into September. The northeast part of the province had the best harvest of all types of wild berries. See map below for details:



* Average retail blueberry prices hit all time highs of $3.00 - $3.75/pound. Prices didn't soften, in general, until after Labour Day.

* Pickers were charging an average of $2.00/pound for wild blueberries in the central area from Prince Albert to La Ronge and $1.75/pound on the west side from Meadow Lake to La Loche. This is a rise from the $1.50/pound average from 1989.

* The total pounds of wild berries sold within the buyers and sellers listing service in Saskatchewan is as follows:

Wild blueberries	-	33,600 lbs.
Saskatoon berries	-	10,300 bls.
Chokecherries	-	2,460 lbs.
Pincherries	-	500 lbs.
Ligonberries (dry ground cranberry)	-	300 lbs.
High Bush Cranberries	-	500 lbs.
Total Wild Berries sold	-	47,660 lbs.

J. TECHNOLOGY TRANSFER

No speeches were given but interviews were done for TV.

K. PERSONNEL

All work on this contract was done by Kalya Brunner.

L. EQUIPMENT

No equipment was bought for this project.

M. EXPENSE STATEMENT

		Allotted	Spent
1..	Salaries of professional personnel	$11,000	$11,000
2.	Rental of Equipment Brush Cutter $450 Flail Mower $350	$ 500	$ 9,000
3.	Materials, supplies, incidentals	$ 1,000	$ 1,880
4.	Project travel	$ 2,500	$ 2,130
	Total	$15,000	$15,910
	Contribution from K. Brunner consulting to ADF.		$ 910

APPENDIX I - LIST OF CO-OPERATORS

These co-operators are developing managed wild blueberry stands.

Meadow Lake

1. Evelyn and Rudy Schnaider
2. Chris and Rob Hooper
3. Gus and Isabelle Perschke
4. Bernard Dalpe
5. Ken Schamber
6. Dennis Olsen - sold land
7. Herb Nimmrechtper
8. Dale Neuls

Shellbrook

9. Irvin Amundsen
10. Dave Jackow - dropped out

Nipawin

11. Jake and Viola Froese
12. Gloria and Roy Forbes
13. Alden and Mary Lofstrom
14. Robert and Karin Williamson

Hudson Bay

15. Ken and Lovie Hamilton
16. Joyce Zak
17. Moe and Grace Alain
18. Maryanne Paproski
19. Melodie and Gary Paik

These co-operators are doing blueberry cultivation.

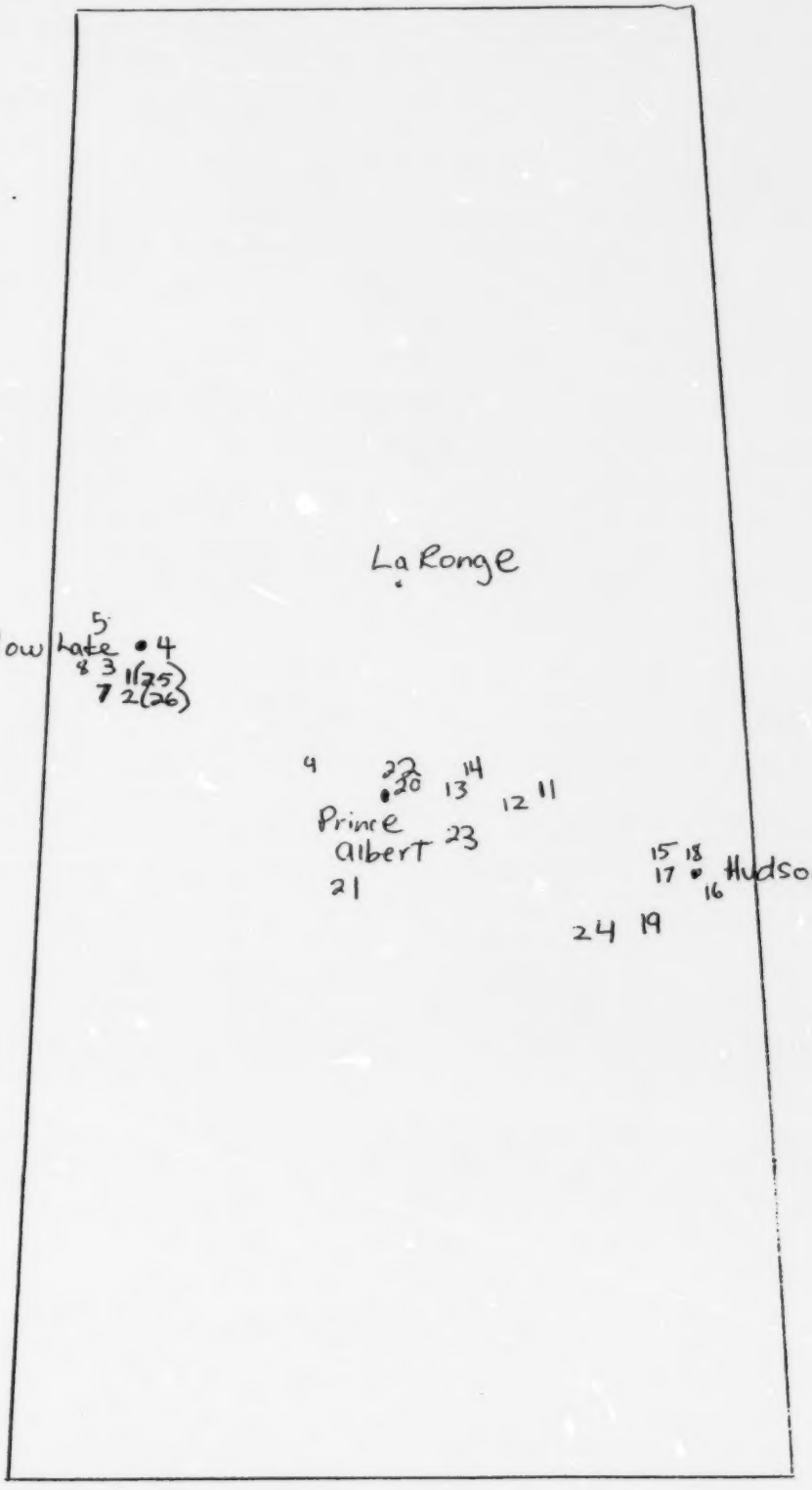
Prince Albert

20. Danny and Marilyn Tkachuk
21. Louise Martin
22. Gina Skoropat
23. Wanda Oleniuk
24. Alvin Hill - out of district
25. Evelyn Schnaider
26. Chris Hooper

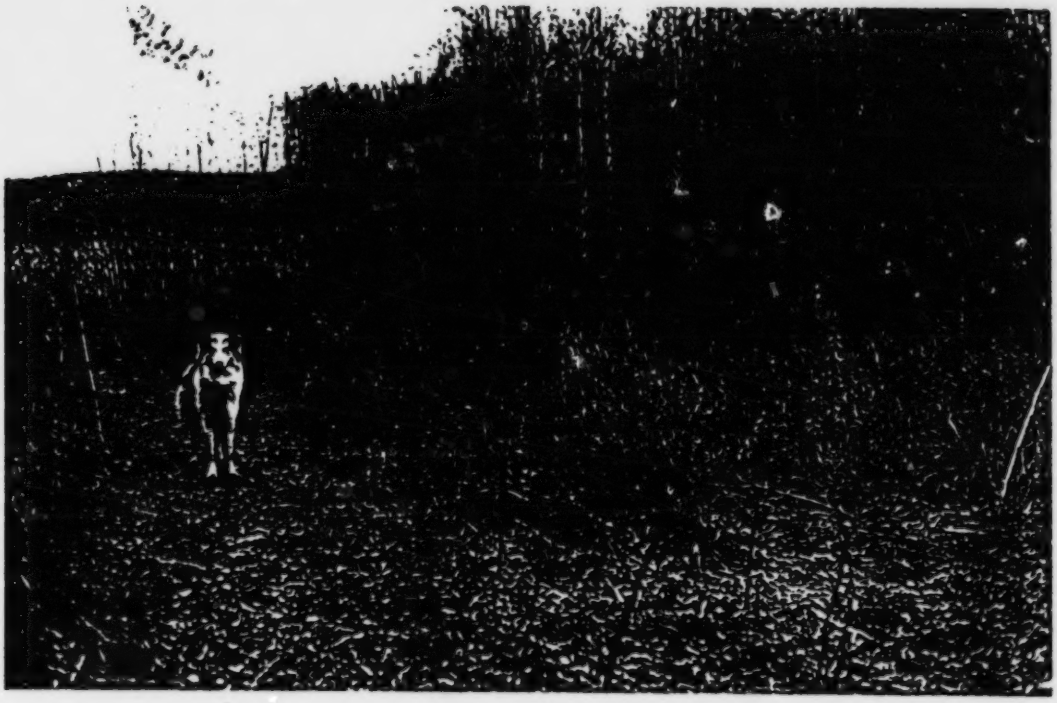
APPENDIX II
Summary of Soil Tests On Wild Blueberry Stands
1984 - 1989
0 - 6"

Location	Texture	pH	N ppm	P ppm	K ppm	S ppm
Elaine Lake	loamy sand	5.3	.5	4	75	4
Shoal Lake	sand	6.5	.5	23	80	3.5
Dore Lake	sand	5.2	.5	11.5	60	3.5
Big River Band Lake	loamy sand	5.6	.5	27	80	2.5
Pinehouse Road	loamy sand	4.6	.5	24	85	3.5
Ile a la Crosse	sand	4.5	.5	11.5	40	4
Eagle Lake	sand	4.8	.5	38	55	3
Ile a la Crosse	sand	4.4	.5	21.5	35	5
Keeley Lake	sand	4.0	.5	10	40	5.5
Clam Lake	sand	4.8	.5	30	60	2.5
Besnard Correction Camp	sand	4.4	.5	19	30	3
Timber Bay						
McKenzie Creek	loamy sand	4.5	.5	13	35	3.5
M.L. - Olsen	loamy sand	5.7	.5	16	150	10
M.L. - Schamber	loamy sand	5.8	.5	26	90	3.5
M.L. - Nimmrichtper	sand	5.5	.5	20.5	210	12
Hudson Bay - Zak	sandy loam	5.0	.5	25	330	12
Meadow Lake - Dalpe	organic	6.4	.9	15	235	4
Nipawin - Williamson	organic	5.3	.4	13.5	140	9
Shellbrook - Jackow	organic	5.8	.3	23.5	205	10
H.B. - Quallie	organic	6.4	.5	20	255	5
Nipawin - Forbes	organic	5.6	.3	15	205	5.5
Nipawin - Newman	organic	6.3	.5	21	180	5
M.L. - Schnaider	sand	4.8	.3	21	85	3.5
H.B. - Quallie	organic	6.3	.4	21.5	165	7.5
H.B. - Quallie	organic	6.8	.4	13	170	5
H.B. - Quallie	sand	6.4	.7	18	190	8.5
M.L. - Graham	organic	5.9	.8	25	330	9.0
Nipawin - Forbes	organic	5.6	.3	15	105	5
H.B. - Quallie	sand	6.1	1	21	110	2.5
H.B. - Fir River Road	organic	5.1	.8	11.5	125	7
Nipawin - Froese	organic	6.1	2.5	15	175	4

MAP 1 - LOCATION OF PLOTS



* Numbers denote co-operators. See Appendix 1 - List of co-operators



Dale Neules, Meadow Lake - blueberry plot flail mowed on the left.

Alden Lofstrom, Nipawin - blueberry plot flail mowed centre.

Highbush Cranberry in Saskatchewan - K. Brunner

1. LOCATION - The highbush cranbery (Viburnum trilobum) is a small tree or shrub which is concentrated along stream beds, particularly on the east side of the province. It appears to prefer moist soil, and shade. Some known locations are:

- streams running off the Pasqua Hills
- streams running off the Porcupine Hills
- Piwei River and tributaries
- Assiniboine River and tributaries
- islands in the North Saskatchewan River
- scattered stream beds across northern Saskatchewan
- many other streams and rivers

2. POTENTIAL VOLUMES OF BERRIES - Cannot be properly assessed without field work. However one very rough guess is as follows:

- If highbush cranberry plants grow along the total lenght of all the streams and rivers listed below
- If the plants grow along the entire lenght of the streams and rivers at an average density of 1 plant per 100 feet (includes areas with dense growth and areas with no cranberries)
- If in the average year, the harvest per plant is 5 lbs.
- Then the volume of berries are 158 lbs per kilometre of stream or river
- Pasqua Hills - approximately 880 km. of streams off the Pasqua Hills
  800 km x 158/lbs/km = 139,040 lbs berries
- Porcupine Hills - approximately 500 km of streams run off the Porcupine Hills
  500 km x 158 lb/km = 79,000 lb berries
- Assiniboine River and tributaries
  260 km x 158 lb/km = 41,000 lb berries
- Piwei River and tributaries including Shand Creek
  200 km x 158 lb/km = 31,600 lb berries

The total volume of berries if all of these assumptions are accurate, on average, would be 290,700 lb. of highbush cranberries. Clearly there are some significant volumes of berries are accessible to harvesters by road or water.

3. HARVESTING - VOLUMES

- There is an average to good crop in 8 or 9 out 10 years
- 5 lbs of berries can be harvested per plant, on the average
- Between the extremes of plentiful and poor years, the average rate of picking is approximately 40 lbs/hour (or 240 lbs per 6 hour day - this does not take into account the time spent in: driving and walking to the picking site, looking for plants, carrying the berries back to the vehicle) Incidentally, blueberries are picked at an average rate of 30 - 50 lbs/day.
- Prices at the Hudson Bay Farmers Market average 60 - 75¢ for fresh berries.

a) IF these figures are average
THEN the average picker could earn approximately 240 lbs x 75¢/lb = $180/day. This doesn't include travel time or expenses, such as gas.

b) IF the picking season was 1 week long, after ripening, but before frost
THEN one picker could pick
7 days x 240 lbs/day = 1,680 lbs.
THEN the value of the harvest for one picker would be
1,680 lbs x 75¢/lb = $1,260.00

c) IF the estimated 290,700 lbs of highbush cranberries were harvested (with all the assumptions being valid)
THEN it would take
173 pickers x 1 week to harvest the berries

d) IF the estimated 290,700 lb of berries were sold by the pickers at 75¢/lb
THEN the gross returns from the harvest to the pickers would be
290,700 x 75¢/lb = $218,000.00

e) Multiply the figures by 45 to give an idea of harvest over 50 years

f) The retail value of a processed product and the economic spin offs from this harvest would be additional returns. Operating costs would be subtracted from the gross returns.

4. HARVESTING - METHODS

- Harvesting is foraging of wild plants as no commercial plantings are in production
- The harvest is hand picked. If the average rate of hand picking is 40 lb/hour, this sounds fairly fast. Blueberries are hand picked at a rate of 4 lb/hour on the average. I'm not certain that hand held vibrating rakes would speed up the harvest much.
- Timing of harvest
  a) pick berries for jam for high pectin content
     - before frost
     - when yellow colored berries are turning red
     - before berries are mushy or soft
     - there is less smell during cooking, if the berries are picked early
  b) pick berries for juice
     - when red, but not soft or mushy
     - berries will soften with age, even if there is no frost. The soften right after a frost
     - as soon as berries soften they are harder to pick
  c) pick berries when frozen solid
     - only if they freeze solid and stay frozen on the branch. However, the berries usually freeze and thaw many times and sometimes ferment before they freeze hard.

- There is sometimes blackened plant material among the berries that has to be picked out, by hand. This is another reason for picking the berries before they get soft and mushy.

5. CLEANING
   - It may be possible to clean out some of the debris among the berries by using the blueberry cleaner
   - In North America, the blueberry cleaner is used on fresh berries for the fresh market. It uses an air blower to seperate debris from the berries, and a sizing table to seperate the samll (old and wrinkled, or young and undersized) berries from the large ones.
   - Fresh berries for the frozen market are cleaned by a water bath. This is a faster, cheaper process than cleaning for fresh market.
   - In Finland, the berries and debris are frozen straight from the field. They are cleaned using air blowers after freezing solid.

6. PROCESSING
   - Dr. Nicholas Low has already outlined the major processing possibilities based on his work on highbush cranberries in 1989
   - Upon interviewing Grant Rigby, a juice processor in Winnipeg, these points were made:
     - Juices from wild berries will have to be competitive with the main stream juices unless niche markets are found

       Orange juice 45 - 75¢/1b
       Apple juice 45 - 75¢/1b

     - Juices from wild berries, if very flavorful, could become more price competitive if
       - mixed with cheaper juice
       - diluted with water, sweetener added
     - Juices from the highbush cranberry has to be free of the odour. Some recipes call for lemon to reduce this
     - Juices do not have to be priced as competitively if directed towards as specialty or niche market.
       - for example, the bog cranberry has been prescribed as a drink to dissolve kidney stones
     - Based on Mr. Rigby's experience
       a) the cost of lingonberry or blueberry juice would be approximately $1.75 - 2.00/1b* ÷ 50% juice recovery from whole berries = $3.50 - 4.00/1b for juice
       b) the cost of Saskatoon berry juice would be similar. since fresh berries retail at $2/1b and up

       * includes cost of shipping

c) the cost of highbuch cranberry juice would be approximately
70 - 85¢/1b* x 75% juice recovery from whole berries = 93¢ - $1.13/1b for juice
* includes cost of shipping
This is much cheaper than blueberry or lingonberry juice.

7. MARKETS

- Highbush cranberries are significantly cheaper than most of the other wild berries.
Average prices to pickers (handling, shipping not included) are
  - blueberry $1.50/1b
  - lingonberry $1.25 - 1.50/1b
  - Saskatoon berry $2.00 - 2.50/1b
  - Chokecherry 50 - 75¢/1b
  - highbush cranberry 60 - 75¢/1b
  - cultivated strawberries $1.50/1b
  - cultivated raspberries $1.50/1b

Highbush cranberries maybe cheap enough to compete in the high volume, low priced processed market for juices, fruit leathers, concentrates etc. This should be looked into further.

1990 BERRY BUYERS
KALYA BRUNNER - PHONE 982-4643

Cadillac	Meadowlark Products Box 66 - S0N 0K0 Brenda LaCelle - jams	785-4730
Christopher Lake	Lakeland Art Gallery Box 180 - S0J 0N0 Rose Mineau	982-4751
Flin Flon	- North of 53 Co-op Marilyn Peterson, produce manager, wants Saskatoon berries only	(204) 687-7548
Hague	Merry Made Jams Box 658 - S0K 1X0 Chester & Marilyn Steiner	225-2180
Kelowna	B.C. Fruit - fruit stands in Regina, Saskatoon.	(604) 765-9444
Lloydminster	Rod Baynton Box 186 - S9V 0Y1	825-3348
Lumsden	Scotties Greenhouse Charles Nye Box 482 - S0G 3C0	731-3511
Moose Jaw	Life Source 129 - 1st Avenue NE S6H 0Y9	691-0330
Nipawin	Gane Apiaries Ltd. Box 248 - S0E 1E0 - jam	862-3011
Outlook	SIMA Garden & Kitchen Box 676 - S0L 2N0 Silke Verwimp - makes jams, preserves	867-8511
Pangman	Harvest Pie Box 191 - S0C 0C0 Mr. & Mrs. Sotropa	459-2778

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Prince Albert	Nutters Fruit & Nut Co. #15 365 - 36th Street West Prince Albert, SK S6V 7L4 Janice Favreau	922-3838
Regina	Gloria's Jams 2610 Neff Road East - S4V 1K5	789-0499
Regina	Youth Unlimited Marion Gracey 3304 Dewdney - S4T 7V1	525-2148
Saskatoon	Baba's Perogies Alice 1105 Central - S7N 2K8	933-4280
Saskatoon	Beaver Foods Mike Nicholson - caterers for northern mines	975-7767
Saskatoon	I.W. Camp Catering Bill Smith, Erma - caterers for northern mines	242-6235
Saskatoon	Spring Creek Market 1111 Louise Avenue and stand on 22nd St & Ave. W Darlene Derdall	935-6191 242-9114
Saskatoon	Varsity Fruit Co. Joan Gateley 1617 Preston Ave. - S7H 2V7	374-2819
Saskatoon	Western Development Museum 2610 Lorne Avenue - S7J 0S6 Pat Delong - jam	931-1910
Saskatoon	Donna Cram Faculty Club Box 388, Sub P.O. #6 U of S Campus - S7N 0W0	966-7774
Saskatoon	Grant Wood Dept. of Horticulture Science U of S Campus - S7N 0W0	966-5865 343-0262

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Shaunavon	Kay Lidfors Box 814 - S0N 2M0	297-2046
St. Walburg	The Farmhouse Inn Box 274 - S0M 2T0 - jam	248-3688
Tisdale	Healthy Harvest Foods & Craft Co-op Ltd. Box 1856 - S0E 1T0 Janice Riese or Roberta - has cool room	873-4685
Waskesiu	- Midwest Denison Mines Cook - Ida Hovdebo	663-2137
Weyburn	Wayne Nelson Box 1295 - S4H 3J9 - jam (craft store)	842-6847
Winnipeg	Grant Rigby 91 Magdalene Bay - R3T 3L3	(204) 269-6842 (204) 523-8879

1990 SELLERS LIST
KALYA BRUNNER - PHONE 982-4643

		Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
1.	Battleford Farmers Market - Kay Frolek - ph. 937-2326		X	X	X		
2.	Beauval - Bouvier Handicrafts - Cecile Bouvier - ph. 288-2105 - work - 288-2332	X					
3.	Beauval - Debbie Mielke or Alfred Gaulthier - ph. 288-2123	X					
4.	Besnard Corrections Camp - Tom McCallum - ph. 888-2150	X					
5.	Borden Farmers Market - Annie Kostiuk - ph. 997-2127		X		X		
6.	Candle Lake - Ship's Lantern Resort Hotel - Ken McNair - ph. 929-4555	X					
7.	Canoe Narrows - Marples Confectionary - Beatrice Marple - ph. 829-2020	X					
8.	Carlyle Farmers Market - Elsie Tafelmeyer - ph. 453-2886		X		X		
9.	Choiceland - Winston Grocery - Don Chow - ph. 428-2222	X					

	Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
10. Choiceland - Eleanor Ealy - ph. 428-2918	X					
11. Christopher Lake - Logan's Family Store - Jim Logan - ph. 982-2118	X					
12. Christopher Lake - Elkridge Service - Ed Andres, Leona Gerwing - ph. 982-4322	X					
13. Cole Bay - North Haven Lodge - Jim Marple - ph. 829-4311	X					
14. Creighton Farmers Market - Lina Bjornson - ph. (204) 687-6101 - Shopie Ostrowski, Denare Beach	X					
15. Davidson Farmers Market - Alma Bennett - ph. 567-4750				X	X	
16. Denare Beach - Roly's General Store - Roly Chretian - ph. 362-2122	X					
17. Denare Beach - Alpine Convenience Store - Dale Markham Rick Reid - ph. 362-2133	X					
18. Deschambault Lake - Ken Siebe - ph. 632-4550	X					
19. Dorintosh - Norma Herriot - ph. 236-3863	X					

	Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
20. Estevan Farmers Market - Bertha Harris - ph. 634-4198		X				
21. Esterhazy Farmers Market - Bertha Fiella - Leota Dixon - ph. 745-2103			X	X		
22. Green Lake - Ed & Sons Service - Ed Hoffert - ph. 832-2132	X					
23. Goodsoil - Bargain Finders Store - ph. 238-4443	X					
24. Herbert Farmers Market - Bill Harding - ph. 784-2457		X				
25. Hudson Bay Farmers Market - Lovie Hamilton - ph. 865-3522 - Nancy Alexiewich - ph. 865-3031	X		X	X		
26. Hudson Bay - Patti Harrison - ph. 865-2891						
27. Ile a la Crosse - M & M Store - Ovide Desjarlais - ph. 833-2424	X					
28. Indian Head Farmers Market - Betty Anne Williamson - ph. 695-2713		X		X	X	

		Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
29.	La Loche - Warren Muller - ph. 822-2384	X	X	X			
30.	La Ronge - Rus Tuk Enterprises - Brenda & Jack Emisch - ph. 425-2848	X					
31.	La Ronge Farmers Market - Debbie DuFrene - ph. 425-3567	X					
32.	La Ronge - Robertsons Trading Post - Alex Roberts - ph. 425-2080	X					
33.	La Ronge - Nature Berry - Gertie Keller - ph. 425-3005	X					
34.	Lloydminster Farmers Market - Linda Pennett - ph. (403) 875-8086	X					
35.	Loon Lake - Pine Cove Resort - ph. 837-4612	X					
36.	Loon Lake - Annie's M & M Store - ph. 837-2134	X					
37.	Meadow Lake Farmers Market - John Geddison - ph. 236-6789			X			
38.	Meadow Lake - Laurel Rascher Mrs. Muffins - ph. 236-6454 work - ph. 236-4062 home	X		X			

		Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
39.	Melville Farmers Market - Shirley Ulmer - ph. 728-5243 - Jane Sawchym - Mrs. Gordon Steffen - ph. 728-3517		X		X	X	
40.	Moosimin Farmers Market - Cynthia Griffin - ph. 435-2075 - Connie Mahler - ph. 435-2843		X				
41.	Nipawin Farmers Market - Hazel Petersen - ph. 862-9255	X	X	X	X	X	
42.	Outlook Farmers Market - Loretta Ballek - ph. 867-8428				X		
43.	Pelican Narrows - Seepeeseek Camps - Eugene Klein - ph. 632-2019	X					
44.	Pierceland - W.W. McClellan (Store) Bill, Judy, Barb - ph. 839-2066	X					
45.	Pinehouse - Pinehouse Co-op Store - Bill Young - ph. 884-2112	X					
46.	Prince Albert (wholesale) - Root Cellar - Len Donais - ph. 764-4499	X	X				
47.	Prince Albert - Mabel Halkett - ph. 922-8436	X	X				

	Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
48. Prince Albert Farmers Market - Mr. & Mrs. Eugene Johns - ph. 764-8337	X	X				
49. Raymore Farmers Market - Robert Neish - ph. 746-4467 - Mrs. Neish - ph. 746-4910 - Mrs. Whitlock - ph. 746-4570		X		X		
50. Regina Farmers Market - Norman McNally - ph. 731-2609 - Paul Rock		X		X		
51. Rose Valley Farmers Market - Elizabeth Bandura - ph. 332-2118 - Emily Dubrieuil			X	X		
52. Rosthern Farmers Market - Elsie Siemens - ph. 232-4742		X		X		
53. Sandy Bay - Leo's Pool Hall - Leo & Rhonda Merasty - ph. 754-2134	X					
54. Saskatoon Farmers Market - Lorna Shaw-Lenno - ph. 249-2511	X	X		X	X	
55. Strasbourg Farmers Market		X				
56. St. Walburg Farmers Market - Marie Helperl - ph. 248-3370	X					

		Blueberry Cranberry (Lingonberry)	Saskatoon Berry	Highbush Cranberry	Chokecherry	Pin Cherry	Wild Strawberry
57.	Swift Current Farmers Market - Grace Kushner - ph. 773-2786 - Helen Simonson - Brenda LaSalle, Cadillac		X		X		
58.	Tisdale Farmers Market - Linda Wood - ph. 873-5277 - Mazie Parbst, Ridgedale	X	X	X	X		
59.	Tisdale - Healthy Harvest Foods & Craft Co-op Ltd. - Janice Riese - ph. 873-4685	X	X	X	X		
60.	Wadena Farmers Market - Helen Morozoff - ph. 338-2764 - Effie Pentcluke, Foam Lake		X		X		
61.	Weyburn Farmers Market - Jean McNaughton - ph. 842-5884		X		X		
62.	Weyakwin - Thunder Hills General Store - Judy Jackson - ph. 663-5629	X					
63.	Whelan - Pearl and Harry Neilly - ph. 837-4608	X					
64.	Wynyard Farmers Market - Tom Furns - ph. 554-2637		X	X			